KONICA FT-1 MOTOR

by Robert Dunn, Berkey Marketing

Fig. 1—Front view, adjustments

Fig. 2—Bottom view

Fig. 3—Top cover removed

Fig. 4—Top cover and T and ASA resistors removed

Fig. 5—Top view, AE amplifier removed

Fig. 6—Front view, front cover removed

Fig. 7—Front view, mirror box removed

Fig. 8—Mirror box and shutter, rear view

Fig. 9—Mirror box, rewind side

Fig. 10—Mirror box with shutter removed

Fig. 11—Mirror box, open F value resistor displayed

Fig. 12—Mirror motor

Fig. 13—Mirror motor, side view

Fig. 14—AE amplifier, close up view

Fig. 15—Diaphragm-driving gears, timing

Fig. 16—Remote control socket

Fig. 17—Shows the various wiring connection combinations between the F-sensor and the F.P.C. plate sub-assy.

Fig. 18—Wiring pictorial

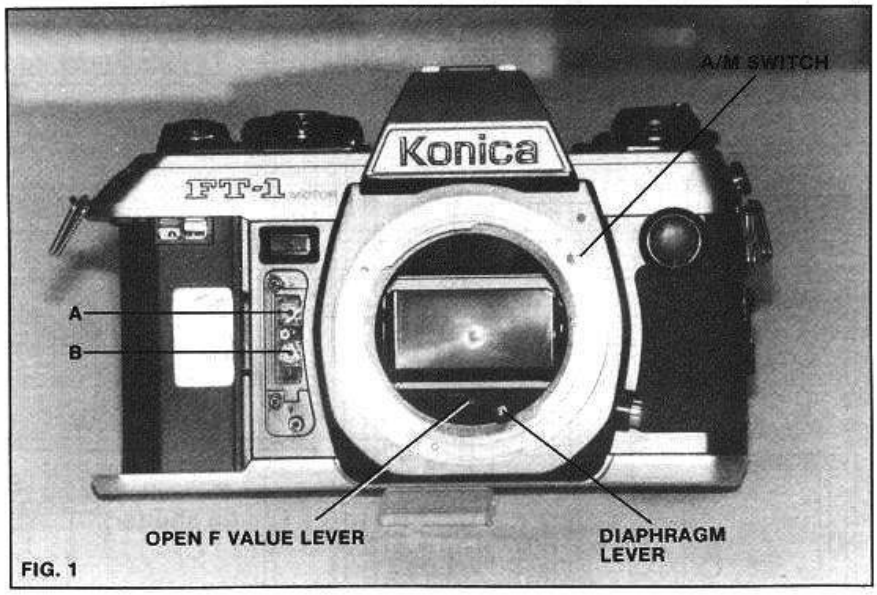


FIG. 1

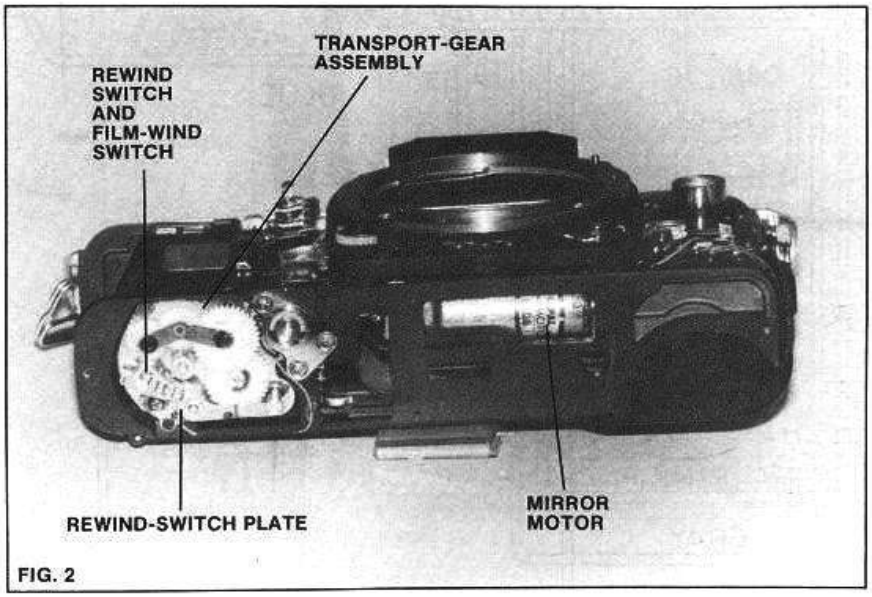


FIG. 2

TECHNICAL SPECIFICATIONS:

Finder display —

LED dot display indicates aperture opening in AE mode, over/under exposure warning, low voltage warning, manual mode setting and correct aperture setting for manual mode, electronic flash ready light, correct aperture setting for stopped-down shooting.

Exposure control—

Shutter speed priority aperture control metering system, manual mode, stopped-down reading function.

AE coupling range—

EV 0.7(fl.8, 2 sec) to EV 19(f22, 1/1000 sec) at ASA 100 (with standard f1.8 lens).

AE lock—

When main switch set at 'AEL' partial depression of shutter release shows aperture setting in finder and locks aperture at that setting (over/under exposure warning inactive in AEL mode).

Adjustment locations:

Constant voltage (VO2)—Fig. 1(A)
Automatic exposure—Fig. 1 (B)
Travel time, first curtain—Fig. 8 (C)
Travel time, second curtain—Fig. 8 (D)
Maximum aperture resistor—Fig. 11(E)
Focal adjustment of the viewfinder—Fig. 5(F)

Principle of Operation

EE Control Circuit

1. The FT-1 automatically controls the diaphragm opening (shutter-speed priority) at the AE setting of the lens. When the release button is partially depressed, S1 closes and turns on the LED display.
   Depressing the release button further closes release switch (S2) and initiates the release cycle.
2. When S2 closes, the circuit energizes the release magnet, Fig. 9, which repels its armature. The armature withdraws a lock pin from the diaphragm ring, Fig. 6, the lens diaphragm turns the diaphragm ring clockwise, and the release-magnet armature strikes the mirror-release lever, Fig. 9. The mirror sector gear, Fig. 9, rotates clockwise and drives the mirror to the raised position.
3. When the diaphragm ring rotates, it drives the diaphragm-detecting gear, Fig. 6, and the diaphragm-detecting gear controls the F-sensor, Fig. 10. The F-sensor is a disc with a series of slits that rotate between a light-emitting diode and a phototransistor. When an opening in the disc exposes the LED, the phototransistor provides an 'on' pulse. The digital pulse train from the phototransistor tells the circuit how far the diaphragm has stopped down.
4. When the diaphragm has stopped down to the correct aperture, the circuit shuts off the aperture-stop magnet, Fig. 10.

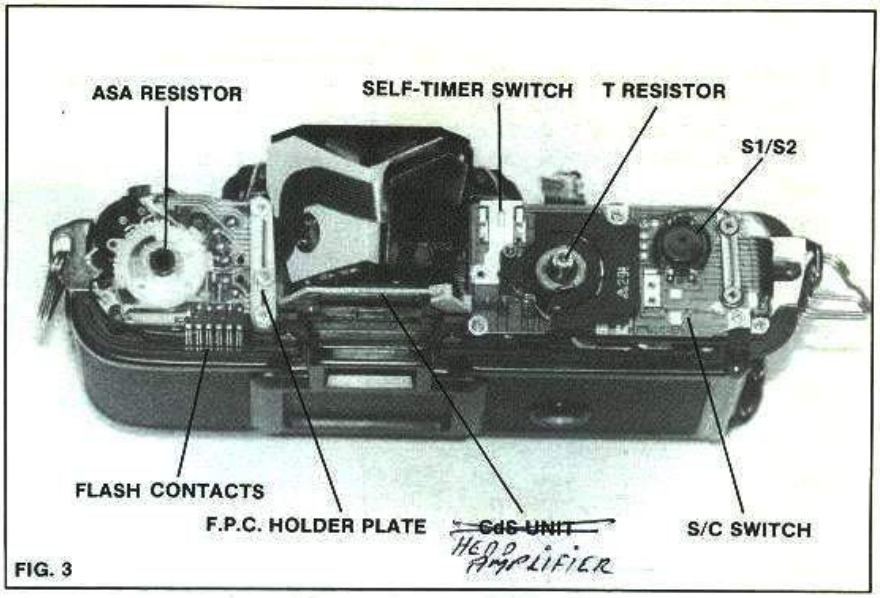


FIG. 3

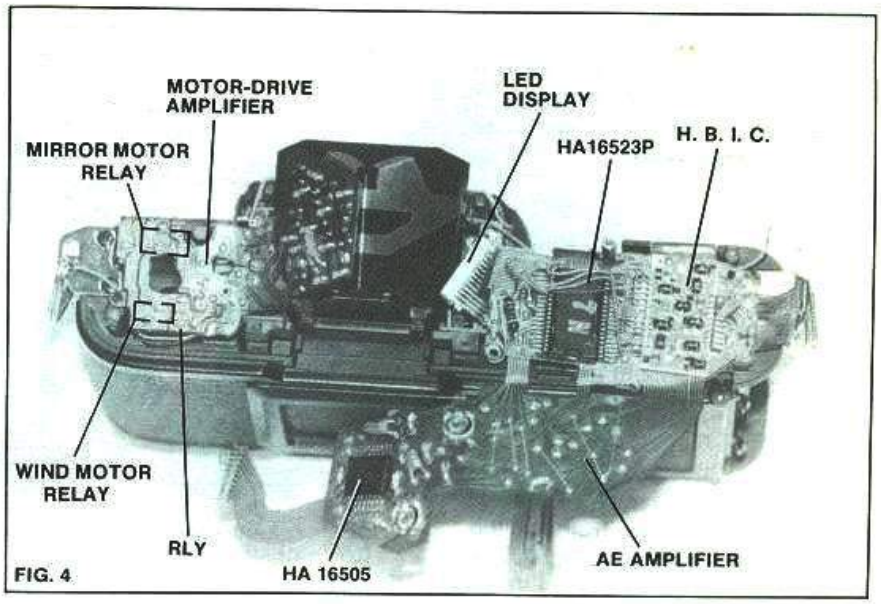


FIG. 4

5. The aperture-stop magnet releases its armature, allowing the stop pawl to arrest the stop gear, Fig. 10. Now the diaphragm ring stops at the proper aperture.
5. The shutter magnets, Fig. 10, control the two curtains. Turning on the first-curtain magnet releases the first curtain. The shutter remains open until the circuit turns on the second-curtain magnet to release the second curtain. When the second curtain completes the exposure, its lug closes the rear-blade information switch SMM1, Fig., 10.
6. Closing SMM1 turns on the mirror motor, Fig. 2. The mirror motor now drives the diaphragm ring counterclockwise to the starting position; the gear on the mirror motor moves up and engages the diaphragm-detecting gear to return the diaphragm ring. Also, the mirror motor charges the shutter and the mirror; the mirror-charge gear, Fig. 9, drives the mirror sector gear counterclockwise to charge the mirror, and the charge lever in the mirror-motor assembly actuates the shutter-cocking lever. As the shutter is cocked, the rear-blade information switch opens. But the mirror motor runs as long as the mirror-motor switch SMM2, Fig. 13, remains closed. SMM2, controlled by a cam inside the motor assembly, and SMM1 connect in parallel — the mirror motor runs when either switch is closed.

7. The AE amplifier, Fig. 4, determines the proper f/stop and controls the magnets and LEDs. The circuit uses three ICs and a hybrid:

—HA 16506-amplifier for the gallium photodiode located on the CdS unit, Fig. 3, if defective, replace the complete AE amplifier flex.

—HA 16505-receives the signal from the photocell amplifier and provides the Fout (f/stop information out) signal to the CPU; if defective, you can replace either the IC or the complete AE amplifier flex.

—HA 16523P-amplifier for the gallium photodiode located on the AE amplifier, Fig. 3, if defective replace the AE amplifier.

—Hybrid IC-provides the switching transistors and outboard capacitors, Fig. 4; if defective, replace the complete AE amplifier flex.

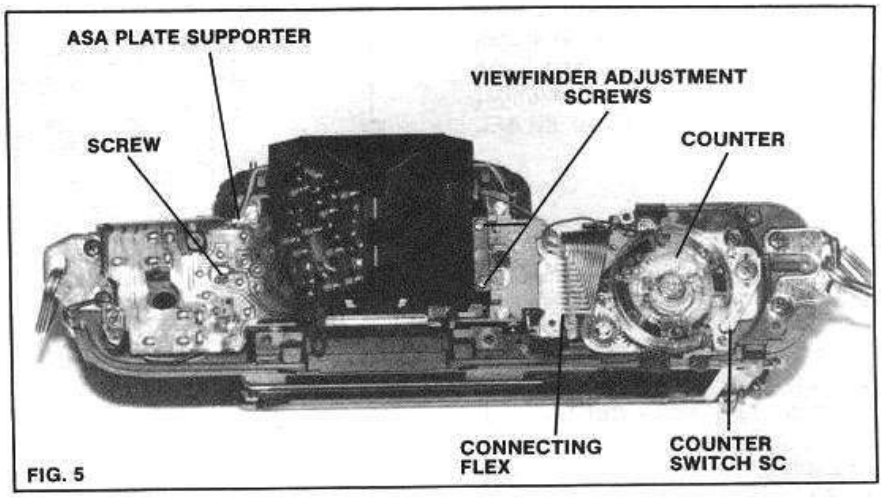


FIG. 5

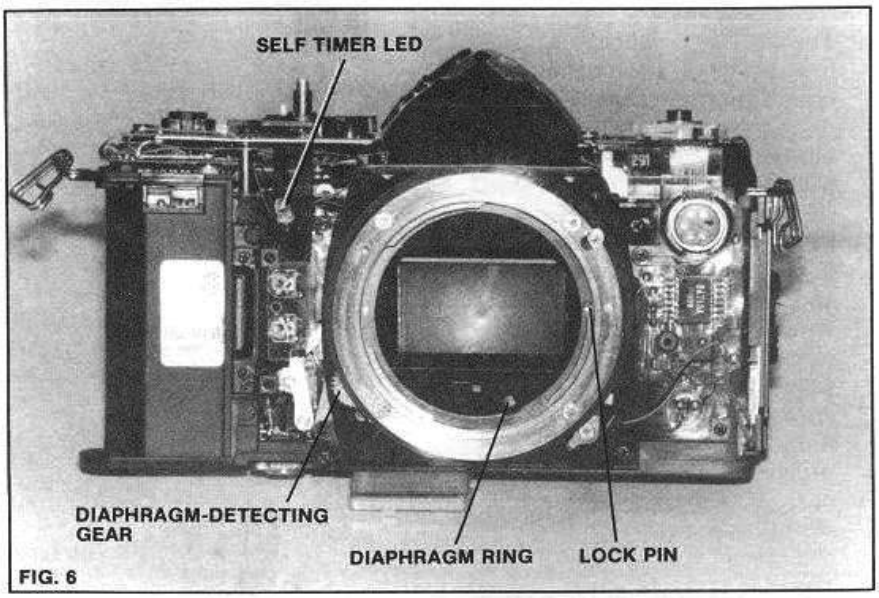


FIG. 6

Film Transport

1. The film transport motor (MF) is in the take-up chamber and the outer shell of the transport motor serves as the take-up spool. When the mirror returns, a relay mounted **under** the motor-drive amplifier, Fig. 4, turns on the transport motor. The transport motor then drives the sprocket through the gear train at the bottom of the camera, Fig. 2. The film-wind switch, Fig. 2, shuts off the relay after one frame has been advanced. In the "S" mode, the camera will complete one sequence and then wait for the release button to be depressed again; in the "C" mode the shutter will continue to operate and the film will automatically advance after each frame if the release button is continually held down.
2. The auto load automatically threads the leader when you close the camera back. Opening the camera back causes the back latch to open the lock-claw switch SBF to keep the transport motor from running. When you close the back, SBF closes and turns on the transport motor. The transport motor now runs until the counter dial reaches the "1" position. A cam surface on the counter dial then allows the counter switch SC, Fig. 5, to open and shut off the transport motor. The transport motor remains off until you depress the release button.
3. Pushing the rewind button to rewind the film actuates the rewind-switch plate, Fig. 2. The rewind switch now prevents the transport motor from running when the counter dial again closes the counter switch.

(Portions of this section from Jan.'82 issue, pgs. 13-15.)

Disassembly

1. Remove battery pack and lens; place ON/OFF switch to "off" position.
2. Remove screw from shutter speed dial using special tool (Part #05115).
3. Remove film rewind knob and spindle.
4. Remove 3 screws from ASA dial.
5. Remove 5 screws and take off top cover (1 screw top - left, 2 screws - rear near eyepiece, 1 screw - through hole in on/off switch, 1 screw top - right). (Fig. 3)
6. Remove front leather, left and right sides.
7. Remove bottom cover. (Fig. 2)
8. Remove 6 screws and take off front cover (don't forget to remove silver screw on left side between the two pots). (Fig. 6)
9. Remove eyepiece, also remove 2 screws from head amp (CdS unit).
10. To remove shutter resistor, re-

move 3 top screws, unsolder blue wire, and remove 2 more screws, holder plate and holder rubber. (Fig. 4)

11. To remove ASA resistor, remove 3 screws and holder plate and holder rubber, remove 2 additional screws (1 top, 1 front), and unsolder black and blue wires. (Fig. 4)
12. To take off AE amplifier: remove shutter resistor set plate, remove 1 additional top screw, loosen 2 screws on side of prism to release LED plate, and unsolder black and red wires. On underside of AE amplifier remove 2 screws and holder plate and holder rubber. (Fig. 5)
13. Take off rear door.
14. Unsolder yellow, red and 2 black wires from front flex P.C.
15. Remove upper baseplate set-screw.
16. Remove screw on left side through hole in motor drive amplifier and take off ASA plate supporter. (Fig. 5)
17. Remove 3 screws and lift out mirror box. (Fig. 7)
18. Remove lock washer from shutter charge arm, and remove 3 screws to take off shutter unit. (Fig. 10)

Reassembly:

1. Charge the shutter and reinstall onto mirror box. Also put lock washer back onto shutter charge arm.
2. Reinstall mirror box onto camera body.
3. Resolder red, yellow, and black wires onto front flex P.C.
4. Reinstall AE amplifier, ASA resistor, shutter resistor, reconnect wires.
5. Reinstall eyepiece, front and bottom covers, top cover, ASA dial, rewind knob and spindle, shutter speed dial, battery pack, lens, and rear door.

Assembling of Diaphragm Driving Gear Baseplate Subassembly (See Fig. 15)

1. Rotate the mirror motor clockwise until mirror motor switch closes, then continue to rotate motor clockwise an additional 4½ turns.
2. The positioning of the gear is done in the following sequence.

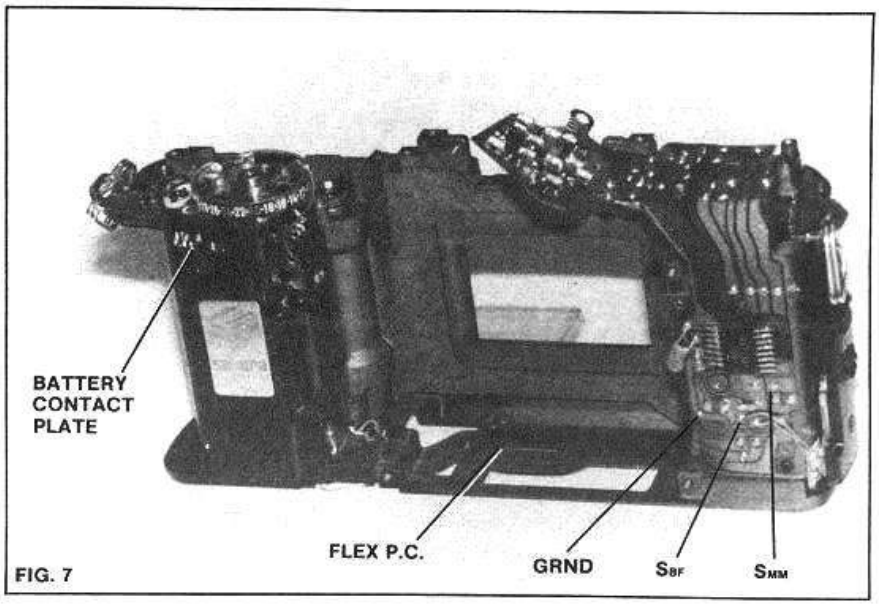


FIG. 7

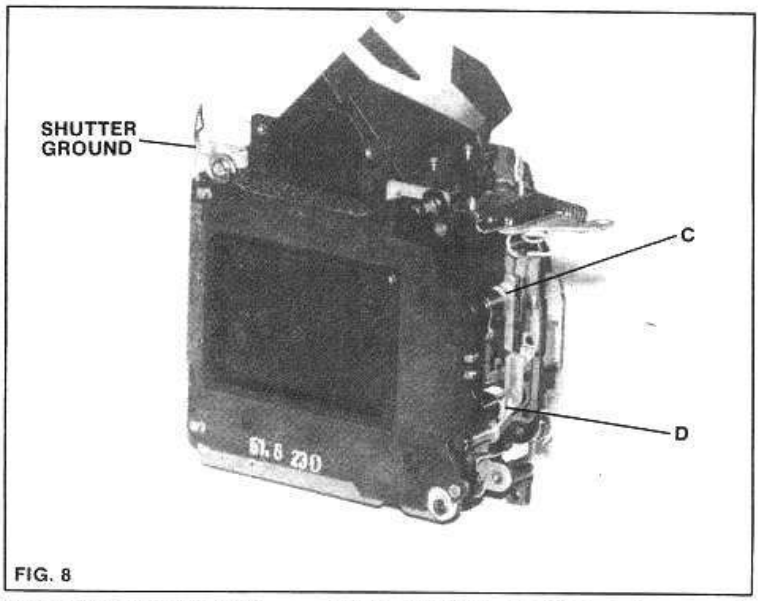


FIG. 8

Hold the dual-sliding section of the worm wheel shaft (1) horizontal and fit the diaphragm ring driving ~~small~~ gear (2) in worm wheel shaft. Here, fit diaphragm ring driving gear (3) so that its first pitch comes in gear with the diaphragm ring driving small gear (2), then turn the mirror motor clockwise an additional 3½ turns. (Fig. 12)

3. The diaphragm driving gear lever (4) must be smoothly operated by the diaphragm driving gear lever spring (5).

Adjustments not normally required:

Open F Value Resistor—
Check the adjustment only if the part has been replaced. To adjust, supply 2.8V DC between the violet wire of the open F value resistor and ground. Then measure the voltage between the pink wire and ground. The variable resistor should be set for a voltage of 1V ± 10MV. (Fig. 11)

Focal Adjustment of the Viewfinder—
Focal adjustment is done by replacing the washers under the penta-prism frame mounting assembly. See Fig. 5

Calibration:

VO_2 Adjustment
Set the VO_2 voltage by measuring the voltage between ground and the wiper of A, Fig. 1, with the release button partially depressed. Adjust for 2.8V±3MV.

EXPOSURE ADJUSTMENT:

(1) Ensure that the exposure is within the standard given in the accompanying table below in the combination shown.

ASA 100

Brightness	LV9	LV12	LV15
Shutter Speed	1/60	1/125	1/250
Aperture	2.8	5.6	11
Standard	±0.8EV		

(2) If the values do not agree with the specifications, adjustment must be made once again with the level adjusting variable resistor (B). Here, the adjustment must be made so that the turning on of LEDs in the view finder may not be shifted in position. (However, allow up to ±1 aperture)

(3) Two variable resistors are fitted to the AE amplifier. Do not move them.

Shutter Curtain Travel Time Adjustment

Curtain travel time should be between 5.85ms and 6.00ms. (20mm distance) using the Copal EM-575 shutter. Adjustment can be made by turning gears labeled C and D (see Fig. 8). This tightens the corresponding springs and will increase shutter time. By lifting up on ratchet plates (Fig. 8), gears will unwind and shutter time will decrease.

Other Comments:

1. If you replace the AE amplifier, make the solder bridge on the new flex as shown in Fig. 14.
2. The shutter comes only as a complete assembly.
3. Part numbers of some replacement parts:
   AE amplifier 801
   Battery case 835
   Shutter 402
   Wind motor 201
   Diaphragm gear sub-assembly 533

Troubleshooting:

Individual replacement components are not available for the AE amplifier.

Dark current (with S1 off) — 0μa

Current drain with S1 depressed — 20μa

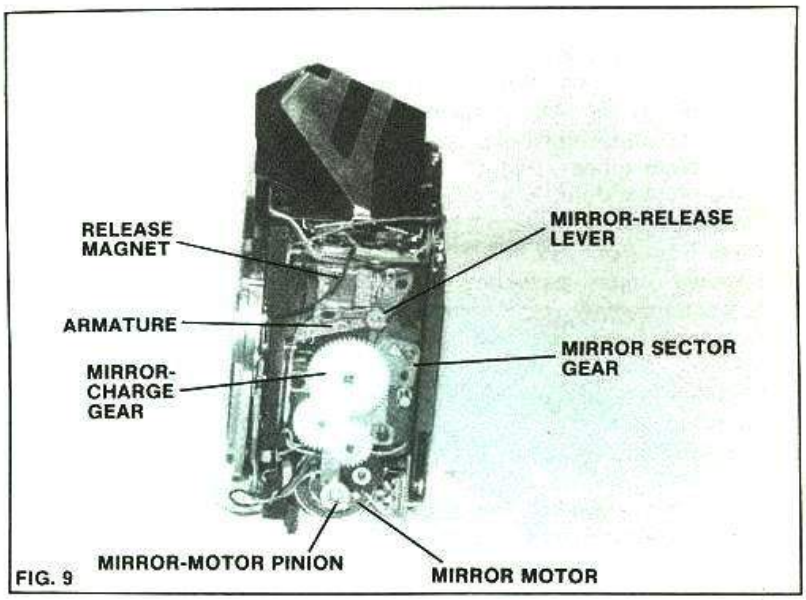


FIG. 9

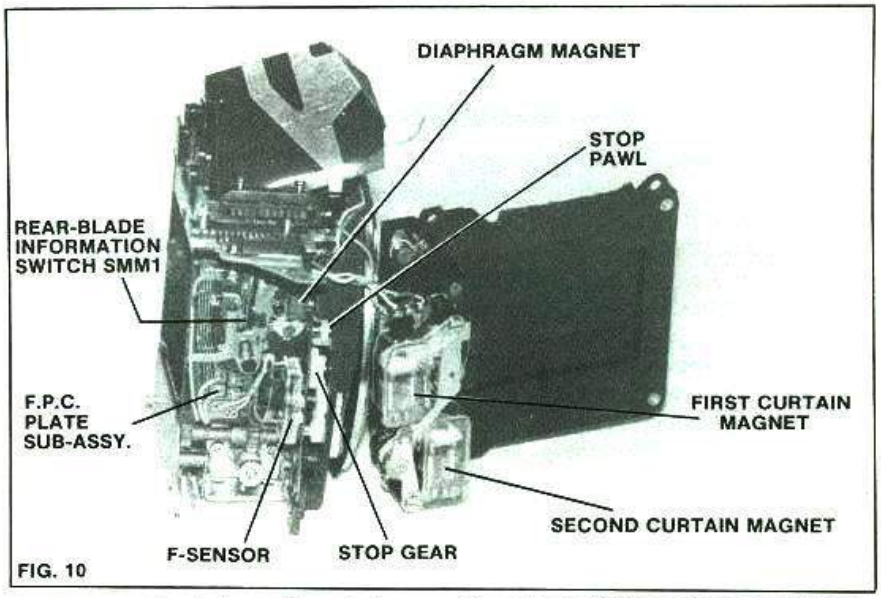


FIG. 10

Average current drain with wind motor running — 600ma.

Symptom: Mirror stuck in up position

Possible causes:
Mirror motor defective
Gears stripped or jammed

SMM1 (rear blade information switch) poor contact

Symptom: Mirror motor starts winding film before second shutter curtain closes

Possible causes:
SMM1 contacts may need adjustment — may be too close together

Symptom: Mirror motor runs continuously

Possible causes:
SMM1 contacts always closed

Symptom: Mirror stuck in mid-position

Possible causes:
Check batteries, voltage may be low
Mirror charge gear jammed
Mirror motor defective

Symptom: Shutter is operational but mirror will not operate

Possible causes:
HA16523P on AE amplifier. Connect pin 30 to ground; if the release magnet operates and the mirror rises then the IC is defective. Replace the AE amplifier. If the release magnet is not operational, then the release magnet is defective. (Note: pins 32 and 33 are for the first curtain magnet and the second curtain magnet, respectively).
Release magnet dirty armature
Release magnet coil open or shorted. Should be about 200 ohms between the red and blue wires.
Poor contact at flex connectors.

Symptom: Mirror is operational but shutter will not work

Possible causes:
Poor shutter ground — check black wire
Shutter magnets

Symptom: Aperture always fully open

Possible causes:
Diaphragm magnet or HA16523P. Check and see if the diaphragm magnet energizes when pin 31 on HA16523P is shorted to ground. If magnet energizes, HA16523P is the problem — replace the AE amplifier; if not, the diaphragm magnet is defective. The resistance between the red and green wires on the diaphragm magnet should be about 300 ohms.

Symptom: Aperture stops fully down in AE mode

Possible causes:
—A/M switch
—Poor electrical contact at flex connectors
—F sensor defective — to check, disconnect the four F sensor wires from the flex P.C. The red and gray wires go to the F sensor LED, the yellow and brown wires go to the phototransistor. Apply 2.8V across the LED (red, positive; gray, negative) and measure the electrical resistance between the brown and yellow wires (the phototransistor). As the diaphragm detecting gear is rotated to turn the F sensor disc, the resistance should change. When the disc pattern exposes the LED, the resistance should be below 1k, and when the LED is covered, the resistance should be greater than 100k ohms.
—IC HA16523P on amplifier. Replace AE amplifier.

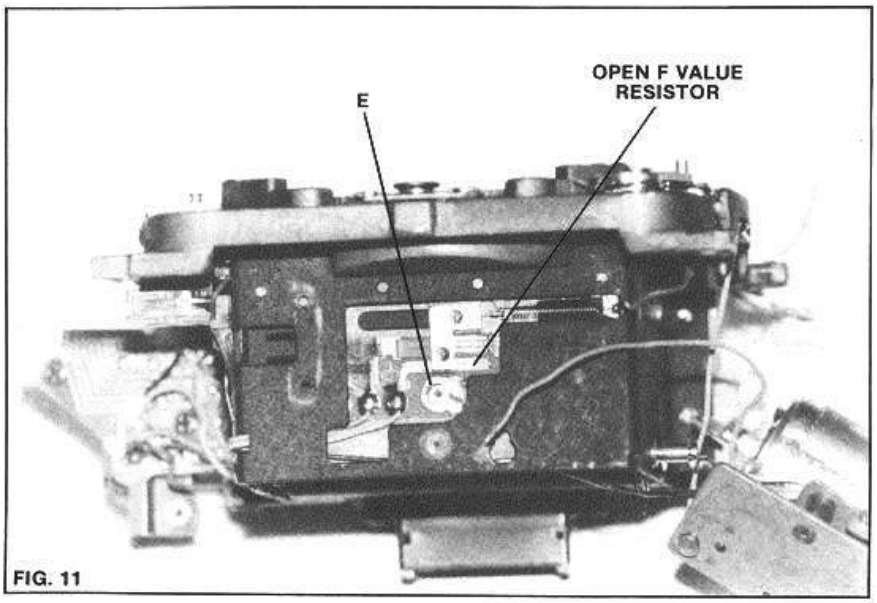


FIG. 11

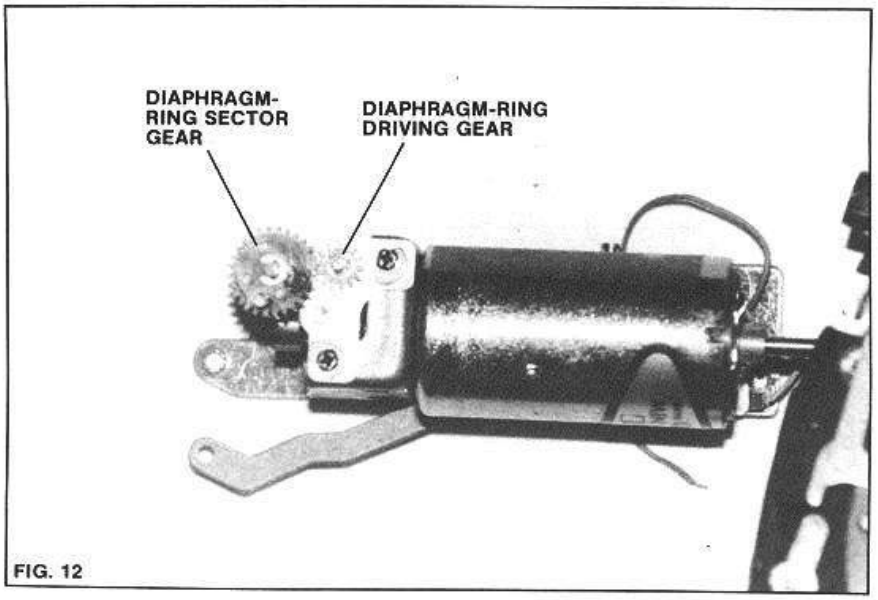


FIG. 12

Symptom: End of film LED stays lit

Possible causes:
IC on motor drive amplifier (BA713A). Replace motor drive amplifier.

To check wind motor:

1. Short RLY (Fig. 4) to ground; film wind motor should run continuously.
2. Short Smm (Fig. 7) to ground; film wind motor will advance one frame after mirror motor cycles.
3. Short S_{BF} (Fig. 7) to ground; film wind motor will advance.

Symptom: Diaphragm ring does not return to original position.

Possible cause:
Diaphragm ring driving gear teeth stripped or center hole deformed.

Notes for handling:

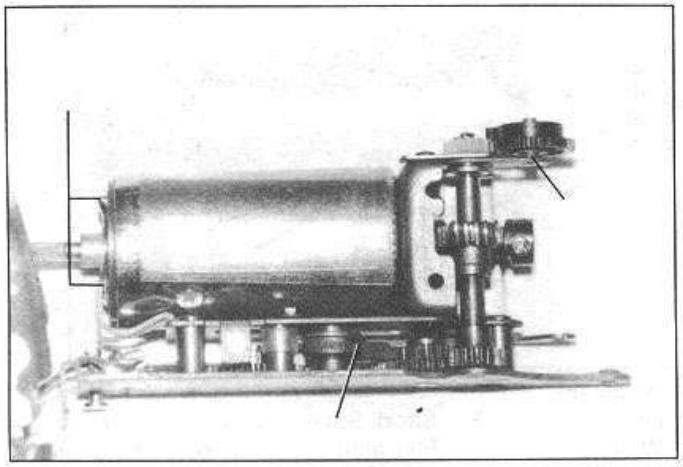
1. When an accessory is fitted to the accessory terminal, the camera cannot be set to the self-timer mode.
2. Set to the B mode, the camera cannot be set to the self-timer

mode (the shutter will be immediately released).

3. Even if the main switch is turned off while the camera is in motion, the camera keeps operating until one sequence is over.
4. When the back cover is closed within two seconds after the main switch is turned off, the camera is set to AL.
5. In the AEL Mode, no warning is flashed either against high or low light intensity.
6. Even when the indicator in the finder goes off (with the power source at less than 5.15±0.15V), AL is under way.
7. When the film end indicator LED is turned on, the LED stays lit even when the on/off switch is turned to the off position.

Addition functions in terms of specifications

Feature	Outline
S/C switch	The single-frame shooting mode may be switched to the continuous-shooting mode and vice versa with an S/C switch.
Improved frame speed	About 2 frames/sec
Film transport ascertained	The transport mark at the back of the back cover is in action when the film is transported.
AE lock	The release button may be locked in the first step (S_1) with the power source switch lever set to AEL.
Exposure compensation	±2 EV (with ASA 100 ∿ ASA 800). Note 2 EV only on one side with ASA 25 (-side) and 3200 (+side).
Self-cancellation	Self-cancellation may be done with the action of the release switch in the first step (S_1) after the self-timer has gone into action.
Improved optical system of the finder	1. Mirror reflector surface: Increased reflection coat 2. Pentaprism: Unnecessary rays removed.
Power source	Used both for exposure control and film wind. Four LR03 dry cells or four LR6 dry cells. (Magazine type: Separate magazines for LR03 and LR6. The main body's handgrip also serves as the battery compartment.)
External color	Black or chrome



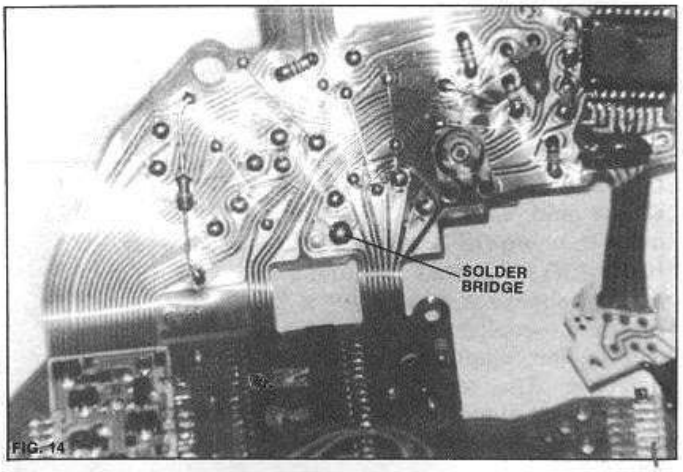
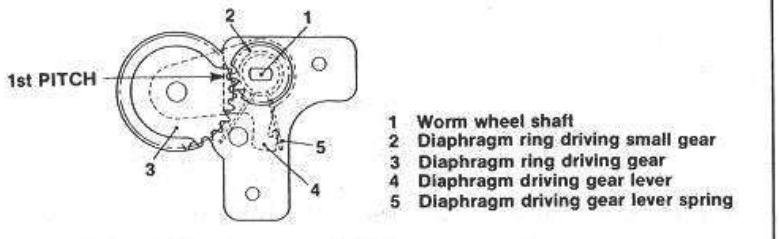
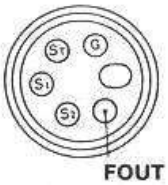


FIG. 14



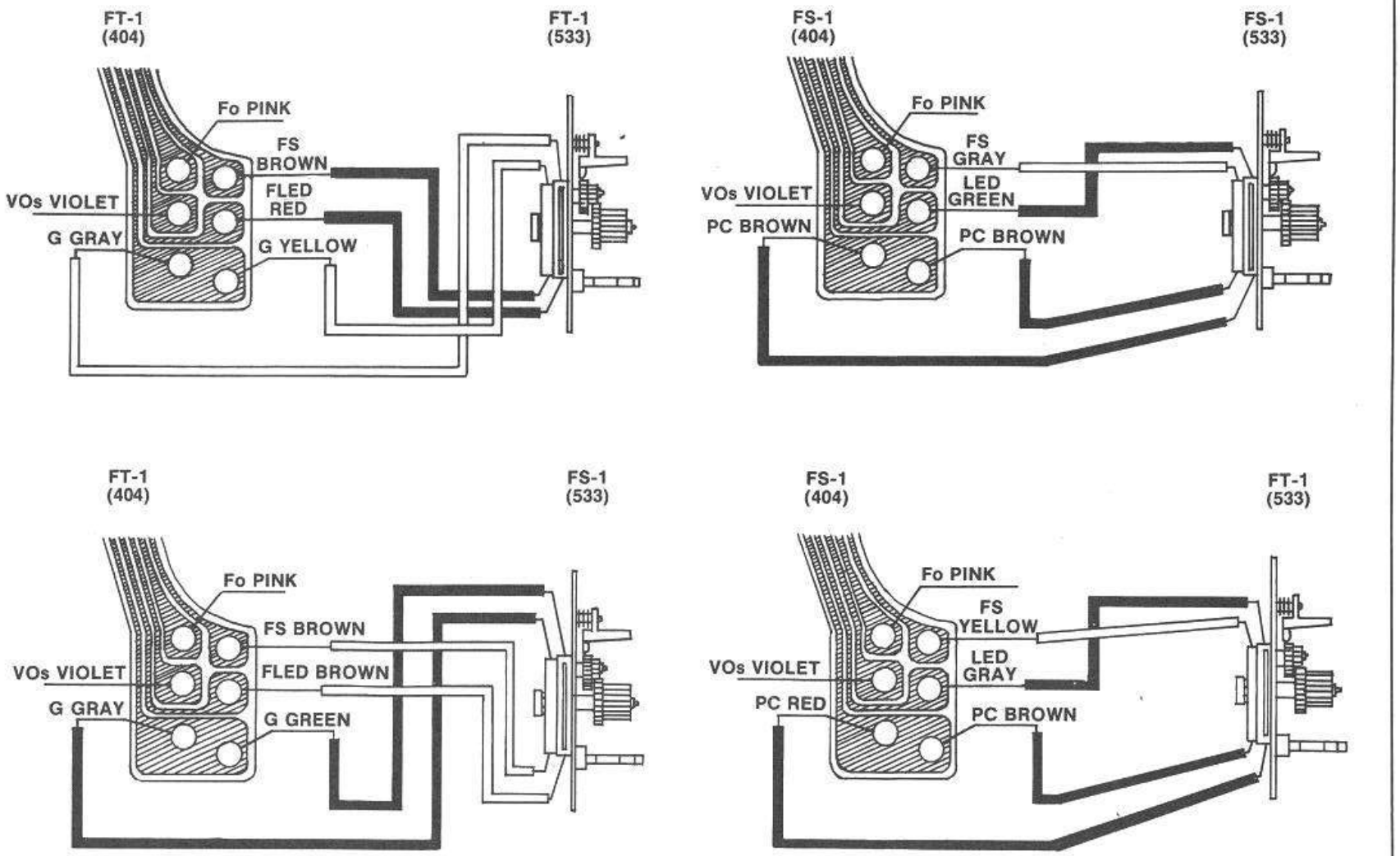
1 Worm wheel shaft
2 Diaphragm ring driving small gear
3 Diaphragm ring driving gear
4 Diaphragm driving gear lever
5 Diaphragm driving gear lever spring

FIG. 15



REMOTE CONTROL SOCKET

FIG. 16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GREEN
VOs VIOLET
PC BROWN
PC BROWN
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PC RED
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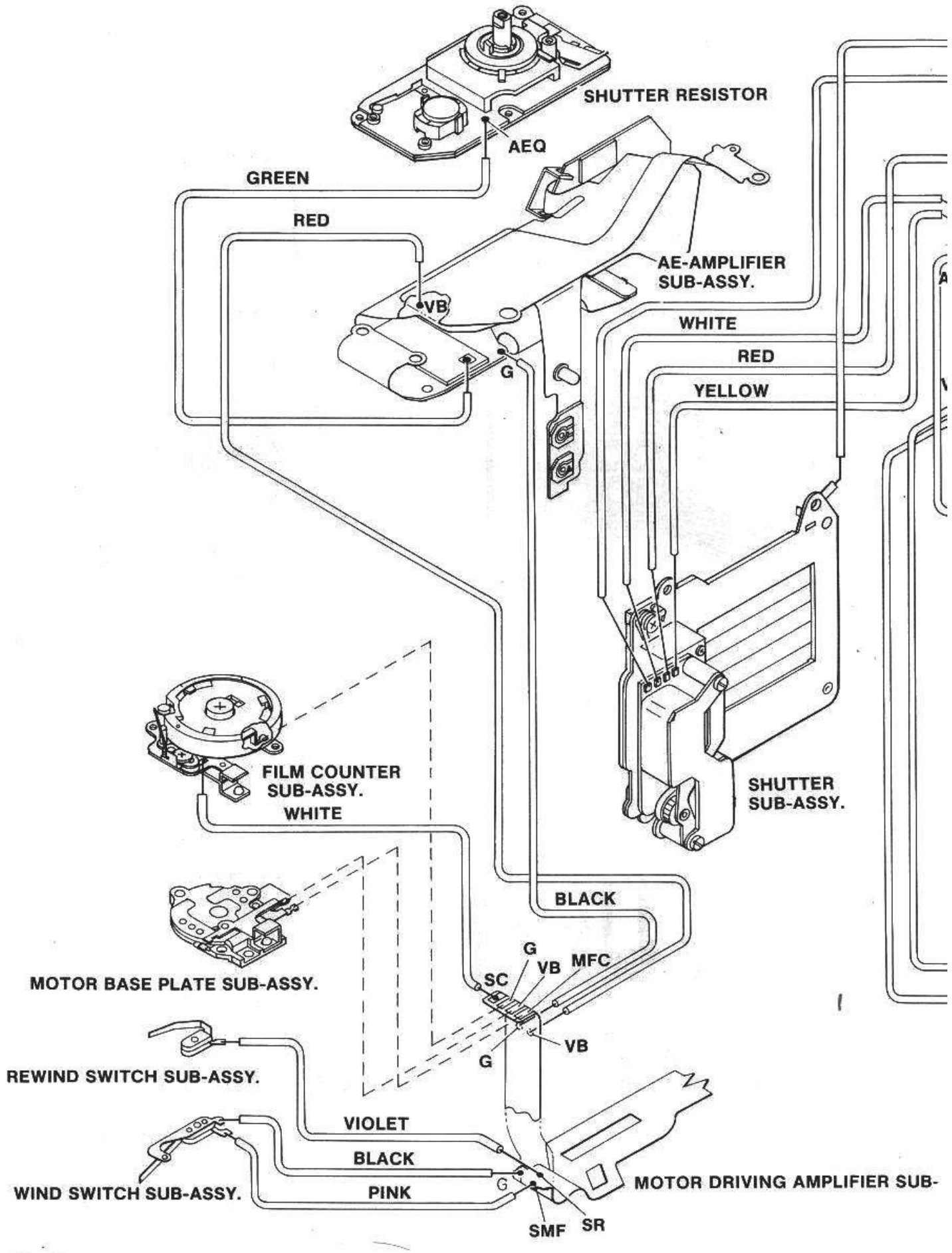
FIG. 17


SHUTTER RESISTOR
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GREEN
RED
AE-AMPLIFIER SUB-ASSY.
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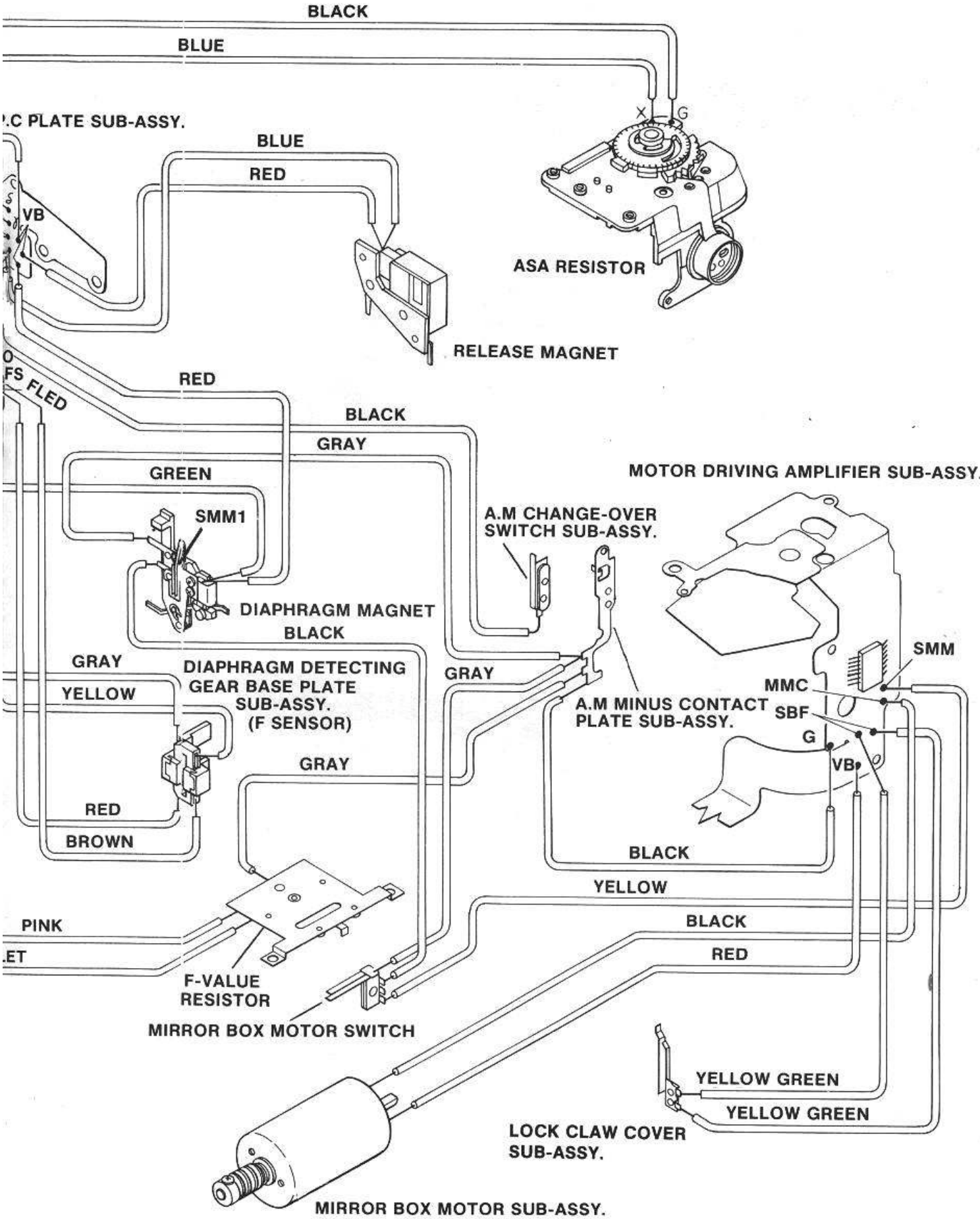
RED
YELLOW
SHUTTER SUB-ASSY.
FILM COUNTER SUB-ASSY.
WHITE
BLACK
MOTOR BASE PLATE SUB-ASSY.
G
VB
MFC
SC
VB
G
REWIND SWITCH SUB-ASSY.
VIOLET
BLACK
WIND SWITCH SUB-ASSY.
PINK
G
MOTOR DRIVING AMPLIFIER SUB-
SMF
SR

FIG. 18


BLACK
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BLUE
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X
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ASA RESISTOR
RELEASE MAGNET
RED
BLACK
GRAY
GREEN
MOTOR DRIVING AMPLIFIER SUB-ASSY.
SMM1
A.M CHANGE-OVER
SWITCH SUB-ASSY.
DIAPHRAGM MAGNET
BLACK
SMM
GRAY
DIAPHRAGM DETECTING
GEAR BASE PLATE
SUB-ASSY.
(F SENSOR)
GRAY
MMC
YELLOW
A.M MINUS CONTACT
PLATE SUB-ASSY.
SBF
G
VB
GRAY
RED
BROWN
BLACK
YELLOW
PINK
BLACK
RED
F-VALUE
RESISTOR
MIRROR BOX MOTOR SWITCH
YELLOW GREEN
YELLOW GREEN
LOCK CLAW COVER
SUB-ASSY.
MIRROR BOX MOTOR SUB-ASSY.